What is claimed is:

1. A computerized parallel efficiency calculation method for calculating a parallel efficiency of a parallel computer system, comprising the steps of:

calculating a load balance contribution ratio representing a load balance degree between respective processors included in said parallel computer system;

calculating a virtual parallelization ratio representing a ratio, with respect to time, of a portion processed in parallel by said respective processors among processings executed in said parallel computer system;

calculating a parallel performance impediment factor contribution ratio representing a ratio of a processing time of a processing portion corresponding to each parallel performance impediment factor to a total processing time of all said processors included in said parallel computer system; and

calculating and outputting to an output device, a parallel efficiency by using said load balance contribution ratio, said virtual parallelization ratio, and said parallel performance impediment factor contribution ratio.

2. A computerized parallel efficiency calculation method for calculating a parallel efficiency of a parallel computer system, comprising the steps of:

calculating a load balance contribution ratio representing a load balance degree between respective processors included in said parallel computer system;

calculating an acceleration ratio representing a limit of improvement in a shortening degree of a processing time by

parallelization of a processing executed in said parallel computer system;

calculating a parallel performance impediment factor contribution ratio representing a ratio of a processing time of a processing portion corresponding to each parallel performance impediment factor to a total processing time of all said processors included in said parallel computer system; and

calculating and outputting to an output device, a parallel efficiency by using said load balance contribution ratio, said acceleration ratio, and said parallel performance impediment factor contribution ratio.

3. The computerized parallel efficiency calculation method as set forth in claim 2, wherein in said acceleration ratio calculating step, said acceleration ratio is calculated as a reciprocal of a value calculated by subtracting a virtual parallelization ratio that is calculated by dividing a sum of processing times of portions processed in parallel in processings executed in said respective processors included in said parallel computer system by a processing time equivalent to a third processing time in a case where the same processing is executed by one processor, from 1.

4. The computerized parallel efficiency calculation method as set forth in claim 3, wherein said third processing time is calculated by a sum of a first processing time equivalent to a total processing time of parallel performance impediment portions in a processing in a case where the processing is executed by one processor and a second processing time as a sum of processing times of portions processed in parallel in said processings executed in said respective processors included in said parallel computer system.

5. The computerized parallel efficiency calculation method as set forth in claim 4, wherein said first processing time is one of a value calculated by dividing a sum of processing times of a redundancy processing in said processings executed in said respective processors included in said parallel computer system by a number of said processors, a maximum value in said processing times of said redundancy processing in said processings executed in said respective processors included in said parallel computer system, a minimum value in said processing times of said redundancy processing in said processings executed in said respective processors included in said parallel computer system, and a value of a processing time of said redundancy processing in a processor in which a total sum of processing times of parallel processings in said processings executed in said respective processor included in said parallel computer system and processing times of processing portions corresponding to said parallel performance impediment factors becomes maximum.

6. The computerized parallel efficiency calculation method as set forth in claim 4, wherein said first processing time is one of a value calculated by dividing a value that is calculated by adding, with respect to all said processors, a fourth processing time calculated by subtracting a processing time due to a parallel performance impediment factor occurring in two or more processors and depending on a number of processors from a processing time due to a parallel performance impediment factor other than a redundancy processing in said processings executed in said respective processors included in said parallel computer system, by a number of said processors, a maximum value in said fourth processing times in all said processors, and a minimum value in said fourth processing times in all said processors.

7. A computerized parallel efficiency calculation method for calculating a parallel efficiency of a parallel computer system, comprising the steps of:

5   calculating a load balance contribution ratio representing a load balance degree between respective processors included in said parallel computer system;

calculating a parallel performance impediment factor contribution ratio representing a ratio of a processing time of a

10 processing portion corresponding to each parallel performance impediment factor to a total processing time of all said processors included in said parallel computer system; and

calculating and outputting to an output device, a parallel efficiency by using at least said load balance contribution ratio and

15 said parallel performance impediment factor contribution ratio.

8. The computerized parallel efficiency calculation method as set forth in claim 7, wherein in said load balance contribution ratio calculating step, said load balance contribution ratio is calculated by dividing

20 a total processing time of said processings executed in all said processors included in said parallel computer system by a longest processing time in said processing times of said processings executed in said respective processors included in said parallel computer system and a number of said processors used in said parallel computer system.

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9. The computerized parallel efficiency calculation method as set forth in claim 7, wherein in said parallel performance impediment factor contribution ratio calculating step, said parallel performance impediment factor contribution ratio concerning a specific parallel

30 performance impediment factor is calculated by dividing a sum of

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processing times of processing portions corresponding to said specific

parallel performance impediment factor in said respective processors

included in said parallel computer system by a sum of said processing

times of said respective processors included in said parallel computer

5   system.

10. The computerized parallel efficiency calculation method as set forth

in claim 7, wherein said processing time is represented by a number of

times of confirmation of corresponding events.

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11. The computerized parallel efficiency calculation method as set forth

in claim 7, further comprising a step of calculating and outputting to

said output device, an auxiliary index by multiplying the calculated

parallel efficiency by a number of said processors used in said parallel

15   computer system.

12. The computerized parallel efficiency calculation method as set forth

in claim 7, further comprising the steps of:

        setting a target parallel efficiency; and

20   calculating and outputting to said output device, an optimum

number of processors by dividing a product of the calculated parallel

efficiency and a number of said processors by said target parallel

efficiency.

25   13. The computerized parallel efficiency calculation method as set forth

in claim 7, further comprising the steps of:

        setting an increase of a working time and a predicted parallel

efficiency at a time of system expansion; and

        calculating and outputting to said output device, an acceleration

30   ratio at said time of said system expansion by dividing a sum of a product

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sum, with respect to all said processings, of a sum of processing times of said processings executed in said respective processors presently included in said parallel computer system and the calculated parallel efficiency, and a product of said increase of said working time and said

5   predicted parallel efficiency, by a sum of working times of said respective processors presently included in said parallel computer system.

14. The computerized parallel efficiency calculation method as set forth

10   in claim 7, further comprising the steps of:

setting a performance magnification of a new parallel computer system relative to said parallel computer system; and

calculating and outputting to said output device, an estimated parallel efficiency by using said performance magnification of said new

15   parallel computer system.

15. The computerized parallel efficiency calculation method as set forth in claim 7, further comprising a step of calculating and outputting to an output device, a system operational efficiency by dividing a product

20   sum of, with respect to all said processings, a sum of processing times of said processings executed in said respective processors presently included in said parallel computer system and the calculated parallel efficiency, by a total working time of said respective processors presently included in said parallel computer system.

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16. The computerized parallel efficiency calculation method as set forth in claim 7, further comprising the steps of:

setting a target processing time;

calculating a target parallel efficiency by using said target

30   processing time; and

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confirming propriety of said target parallel efficiency.

17. The computerized parallel efficiency calculation method as set forth in claim 16, further comprising the steps of:

5   calculating, in a case where said propriety of said target parallel efficiency is confirmed, a parallel efficiency after execution of tuning; and

comparing said parallel efficiency after said execution of said tuning with said target parallel efficiency.

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18. The computerized parallel efficiency calculation method as set forth in claim 7, further comprising the steps of:

setting a target processing time;

calculating an estimated value of a number of required processors

15 for each different algorithm by using parallel efficiencies in the algorithms; and

extracting an algorithm in which said estimated value of said number of required processors is smaller than an acceleration ratio representing a limit of improvement in a shortening degree of a

20 processing time by parallelization of a processing by said algorithm and becomes a minimum value in said estimated values of said number of required processors calculated for different algorithms.

19. A computerized parallel efficiency calculation method for

25 calculating a parallel efficiency of a parallel computer system, comprising the steps of:

calculating a load balance contribution ratio representing a load balance degree between respective processors included in said parallel computer system;

calculating a virtual parallelization ratio representing a ratio, with respect to time, of a portion processed in parallel by said respective processors among processings executed in said parallel computer system; and

5   calculating and outputting to an output device, a parallel efficiency by using a sum of processing times of portions processed in parallel in processings executed in said respective processors included in said parallel computer system, a sum of processing times of the processings executed in said respective processors, said load balance

10   contribution ratio, and said virtual parallelization ratio.

20. The computerized parallel efficiency calculation method as set forth in claim 19, wherein in said virtual parallelization ratio calculating step, said virtual parallelization ratio is calculated by dividing a

15   sum of said processing times of said portions processed in parallel in said processings executed in said respective processors included in said parallel computer system by a processing time equivalent to a third processing time in a case where the same processing is executed by one processor.

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21. The computerized parallel efficiency calculation method as set forth in claim 20, wherein said third processing time is calculated by a sum of a first processing time equivalent to a total processing time of parallel performance impediment portions in a processing in a case where

25   the processing is executed by one processor and a second processing time as a sum of processing times of portions processed in parallel in said processings executed in said respective processors included in said parallel computer system.

22. A computerized parallel efficiency calculation method for calculating a parallel efficiency of a parallel computer system, comprising the steps of:

calculating a first processing time equivalent to a total processing time of parallel performance impediment portions of a processing in a case where said processing is executed by one processor;

calculating a second processing time as a sum of processing times of portions processed in parallel in processings executed in respective processors included in said parallel computer system; and

calculating and outputting to an output device, a parallel efficiency by using a number of said processors used in said parallel computer system, a longest processing time among processing times of said processings executed in said respective processors included in said parallel computer system, said first processing time, and said second processing time.

23. The computerized parallel efficiency calculation method as set forth in claim 22, wherein said first processing time is one of a value calculated by dividing a sum of processing times of a redundancy processing in said processings executed in said respective processors included in said parallel computer system by a number of said processors, a maximum value in said processing times of said redundancy processing in said processings executed in said respective processors included in said parallel computer system, a minimum value in said processing times of said redundancy processing in said processings executed in said respective processors included in said parallel computer system, and a value of a processing time of said redundancy processing in a processor in which a total sum of processing times of parallel processings in said processings executed in said respective processor included in said parallel computer system and processing times of processing portions

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corresponding to said parallel performance impediment factors becomes maximum.

24. The computerized parallel efficiency calculation method as set forth in claim 22, wherein said first processing time is one of a value calculated by dividing a value that is calculated by adding, with respect to all said processors, a fourth processing time calculated by subtracting a processing time due to a parallel performance impediment factor occurring in two or more processors and depending on a number of processors from a processing time due to a parallel performance impediment factor other than a redundancy processing in said processings executed in said respective processors included in said parallel computer system, by a number of said processors, a maximum value in said fourth processing times in all said processors, and a minimum value in said fourth processing times in all said processors.

25. A program embodied on a medium for causing a computer to calculate a parallel efficiency of a parallel computer system, said program comprising the steps of:

calculating a load balance contribution ratio representing a load balance degree between respective processors included in said parallel computer system;

calculating a virtual parallelization ratio representing a ratio, with respect to time, of a portion processed in parallel by said respective processors among processings executed in said parallel computer system;

calculating a parallel performance impediment factor contribution ratio representing a ratio of a processing time of a processing portion corresponding to each parallel performance

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impediment factor to a total processing time of all said processors included in said parallel computer system; and

calculating and outputting to an output device, a parallel efficiency by using said load balance contribution ratio, said virtual

5   parallelization ratio, and said parallel performance impediment factor contribution ratio.

26. A program embodied on a medium for causing a computer to calculate a parallel efficiency of a parallel computer system, said program

10 comprising the steps of:

calculating a load balance contribution ratio representing a load balance degree between respective processors included in said parallel computer system;

calculating an acceleration ratio representing a limit of

15 improvement in a shortening degree of a processing time by parallelization of a processing executed in said parallel computer system;

calculating a parallel performance impediment factor contribution ratio representing a ratio of a processing time of a

20 processing portion corresponding to each parallel performance impediment factor to a total processing time of all said processors included in said parallel computer system; and

calculating and outputting to an output device, a parallel efficiency by using said load balance contribution ratio, said

25 acceleration ratio, and said parallel performance impediment factor contribution ratio.

27. A program embodied on a medium for causing a computer to calculate a parallel efficiency of a parallel computer system, said program

30 comprising the steps of:

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calculating a load balance contribution ratio representing a load balance degree between respective processors included in said parallel computer system;

calculating a parallel performance impediment factor contribution ratio representing a ratio of a processing time of a processing portion corresponding to each parallel performance impediment factor to a total processing time of all said processors included in said parallel computer system; and

calculating and outputting to an output device, a parallel efficiency by using at least said load balance contribution ratio and said parallel performance impediment factor contribution ratio.

28. A program embodied on a medium for causing a computer to calculate a parallel efficiency of a parallel computer system, said program comprising the steps of:

calculating a load balance contribution ratio representing a load balance degree between respective processors included in said parallel computer system;

calculating a virtual parallelization ratio representing a ratio, with respect to time, of a portion processed in parallel by said respective processors among processings executed in said parallel computer system; and

calculating and outputting to an output device, a parallel efficiency by using a sum of processing times of portions processed in parallel in processings executed in said respective processors included in said parallel computer system, a sum of processing times of the processings executed in said respective processors, said load balance contribution ratio, and said virtual parallelization ratio.

29. A program embodied on a medium for causing a computer to calculate a parallel efficiency of a parallel computer system, said comprising the steps of:

calculating a first processing time equivalent to a total

5 processing time of parallel performance impediment portions of a processing in a case where said processing is executed by one processor;

calculating a second processing time as a sum of processing times of portions processed in parallel in processings executed in respective processors included in said parallel computer system; and

10 calculating and outputting to an output device, a parallel efficiency by using a number of said processors used in said parallel computer system, a longest processing time among processing times of said processings executed in said respective processors included in said parallel computer system, said first processing time, and said second

15 processing time.

30. A parallel efficiency calculation apparatus for calculating a parallel efficiency of a parallel computer system, comprising:

a first calculator for calculating a load balance contribution

20 ratio representing a load balance degree between respective processors included in said parallel computer system;

a second calculator for calculating a virtual parallelization ratio representing a ratio, with respect to time, of a portion processed in parallel by said respective processors among processings executed

25 in said parallel computer system;

a third calculator for calculating a parallel performance impediment factor contribution ratio representing a ratio of a processing time of a processing portion corresponding to each parallel performance impediment factor to a total processing time of all said

30 processors included in said parallel computer system; and

a fourth calculator for calculating and outputting to an output device, a parallel efficiency by using said load balance contribution ratio, said virtual parallelization ratio, and said parallel performance impediment factor contribution ratio.

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31. A parallel efficiency calculation apparatus for calculating a parallel efficiency of a parallel computer system, comprising:

a first calculator for calculating a load balance contribution ratio representing a load balance degree between respective processors included in said parallel computer system;

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a second calculator for calculating an acceleration ratio representing a limit of improvement in a shortening degree of a processing time by parallelization of a processing executed in said parallel computer system;

a third calculator for calculating a parallel performance impediment factor contribution ratio representing a ratio of a processing time of a processing portion corresponding to each parallel performance impediment factor to a total processing time of all said processors included in said parallel computer system; and

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a fourth calculator for calculating and outputting to an output device, a parallel efficiency by using said load balance contribution ratio, said acceleration ratio, and said parallel performance impediment factor contribution ratio.

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32. A parallel efficiency calculation apparatus for calculating a parallel efficiency of a parallel computer system, comprising:

a first calculator for calculating a load balance contribution ratio representing a load balance degree between respective processors included in said parallel computer system;

a second calculator for calculating a parallel performance impediment factor contribution ratio representing a ratio of a processing time of a processing portion corresponding to each parallel performance impediment factor to a total processing time of all said

5   processors included in said parallel computer system; and

a third calculator for calculating and outputting to an output device, a parallel efficiency by using at least said load balance contribution ratio and said parallel performance impediment factor contribution ratio.

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33. A parallel efficiency calculation apparatus for calculating a parallel efficiency of a parallel computer system, comprising:

a first calculator for calculating a load balance contribution ratio representing a load balance degree between respective processors

15   included in said parallel computer system;

a second calculator for calculating a virtual parallelization ratio representing a ratio, with respect to time, of a portion processed in parallel by said respective processors among processings executed in said parallel computer system; and

20   a third calculator for calculating and outputting an output device, a parallel efficiency by using a sum of processing times of portions processed in parallel in processings executed in said respective processors included in said parallel computer system, a sum of processing times of the processings executed in said respective

25   processors, said load balance contribution ratio, and said virtual parallelization ratio.

34. A parallel efficiency calculation apparatus for calculating a parallel efficiency of a parallel computer system, comprising:

a first calculator for calculating a first processing time equivalent to a total processing time of parallel performance impediment portions of a processing in a case where said processing is executed by one processor;

5   a second calculator for calculating a second processing time as a sum of processing times of portions processed in parallel in processings executed in respective processors included in said parallel computer system; and

a third calculator for calculating and outputting to an output

10   device, a parallel efficiency by using a number of said processors used in said parallel computer system, a longest processing time among processing times of said processings executed in said respective processors included in said parallel computer system, said first processing time, and said second processing time.

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